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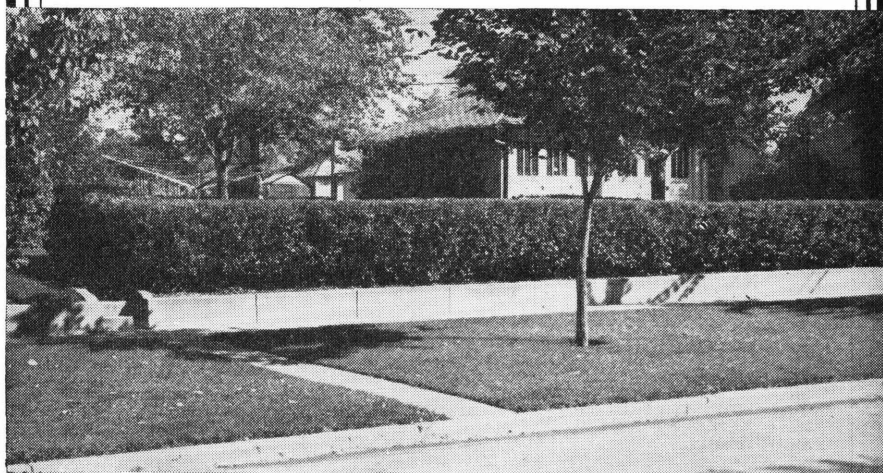
**JUL 11 1942**

U. S. Department of Agriculture

# *Hedge Plants*

**FOR THE**

**NORTHERN GREAT PLAINS**



**FARMERS' BULLETIN NO. 1898**

**U. S. DEPARTMENT *of* AGRICULTURE**

**H**EDGE PLANTS may be used for fences and protective screens and in shelterbelts as well as for ornamental plantings in the northern Great Plains.

Before a hedge is planted the soil should be thoroughly prepared. Good care in the first 2 years, with cutting back to induce bushiness, and regular seasonal shearings thereafter contribute to the success of the planting.

For the special purposes indicated, the species listed below have given the best results at the Northern Great Plains Field Station, Mandan, N. Dak.

High screens or shelters.—Green ash, boxelder, and Chinese elm.

Medium-high, general-purpose hedges.—Common buckthorn, Siberian pea-tree, Russian-olive, and Chinese lilac. The growing of common buckthorn is not recommended, however, because it is a host for crown rust of oats.

Dwarf to medium-high hedges for division lines.—Peking cotoneaster, *Ribes diacanthum*, and flowering plum.

Untrimmed hedges.—Vanhoutte spirea, the *rosea* variety of *Spiraea bumalda*, and the Japanese barberry. Vanhoutte spirea may kill back following dry years but renews itself well. *S. bumalda* may die out in dry periods but does well where water can be supplied. The Japanese barberry seems to be hardy but not drought-resistant, being short-lived under dry-land conditions.

# HEDGE PLANTS FOR THE NORTHERN GREAT PLAINS

By THOMAS K. KILLAND, *principal scientific aide, Division of Dry Land Agriculture, Bureau of Plant Industry*

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## USE OF HEDGES

THE EMPLOYMENT OF HEDGE PLANTS for protective and ornamental purposes in formally sheared or sometimes untrimmed hedges, and also individually or in groups, has a broad appeal to land-owners. Where the more desirable form of mixed shrubbery cannot be fitted in because the area to be treated is limited, a formally sheared or in some cases an untrimmed hedge is desirable, and its use is to be recommended. Such hedges may take the place of fences on larger properties and may also serve as windbreaks. In order to ascertain the kinds of tree and shrub species that could be used for the conditions that prevail on the northern Great Plains area in which the Mandan station is located, as comprehensive a field test as possible of material including shrubs, trees, and roses of known hardiness was inaugurated at the Northern Great Plains Field Station, Mandan, N. Dak., in 1915 and with some later additions has been continued to date.

A fairly large number of species were found to survive general conditions from 15 to 20 years.

The climatic conditions generally prevailing are: Hot and dry summers with temperatures ranging up to 115° F.; winter temperatures as low as -46°; and annual precipitation ranging from 6 to 24 inches over a period of 25 years, with a seasonal precipitation of 3 to 19 inches.

Hedges have many uses. In the present emergency use will be made of them as protective concealment for wartime installations, such as airports. On farms or large properties hedges can sometimes be substituted for fences, and they may be used to enclose the lawn and front yard or as screens to hide unsightly buildings or areas. By themselves or as units of larger shelterbelts, hedges may be used to protect farmsteads from wind and drifting snow, to protect gardens, orchards, and field crops, to cause snow drifts to form where extra water is needed, and to reduce soil blowing. On town and city lots perhaps the main uses will be as separating lines between adjoining properties, division of the front and back yards, or enclosure and shelter for the part of the property set aside for such uses as kitchen garden or drying yard.

When the purpose of the hedge has been determined, the species for the hedge should be selected accordingly. For screen and shelter purposes, trees or tall-growing shrubs should be used; for fences and



enclosures, medium-tall, more or less barbed species; and for front-yard uses low-growing, somewhat informal species.

### PLANTING MATERIAL

The success of the hedge depends much on getting it off to a good start with no gaps from plants that fail to grow. With such strong, vigorously growing species as Chinese elm, boxelder, and buckthorn, 1-year-old seedlings are to be preferred. The advantages of such material are cheapness of stock and better opportunity for the forming of a dense, bushy hedge from the bottom up. With species that are of relatively slow growth when young, 2-year-old seedlings should be selected. With vegetatively propagated species, such as roses, spireas, and lilacs, 2-year-old transplanted stock should be used.

### HANDLING AND PLANTING THE STOCK

In the northern Great Plains, planting should be done in the early spring, after the frost is out of the ground and before the plants begin to send out leaves. When the young plants are received from the nursery, they should be protected as much as possible from drying out before they are set in the ground. If it is not practicable to plant them within a short time, they should be heeled in. To heel in trees place the roots in a shallow trench with one side sloping. Lay the trees against the sloping side with the roots resting in the bottom and the tops pointing up the slope. Fill the soil against the trees so as to cover the roots completely and the bottom portion of the tops. The soil should be packed about the roots and well watered.

The soil should be thoroughly prepared before a hedge is planted. Where the row is to be set, the soil should be spaded or worked to a depth of 1 foot or more. Care should be taken that the roots do not dry out during planting. A piece of wet burlap may be wrapped about them, or the plants may be carried in a pail of muddy water. In general, hedge plants should be spaced about 1 foot apart in the row. The plants should be set slightly deeper than they were in the nursery. Unless the soil has ample moisture, the row should be well watered after it is planted. If planting is followed by dry weather, it may be necessary to water again.

### CARE OF THE HEDGE

After the plants for a hedge are set out, they should be cut back to 5 or 6 inches from the ground in order to induce low branching and bushiness from the start. Little or no shearing is needed the first year. In the spring of the second year all plants should again be cut back to about 6 inches from the ground. The resultant growth may be sheared at a height of 18 inches and the sides trimmed to leave a width of 12 to 14 inches. When a new growth of 6 to 8 inches has been made, it is again trimmed back. If a hedge of the desired height is wanted as soon as possible, 3 to 4 inches of the new growth may be left on the top at each shearing. On the sides the new growth should be cut back to 1 or 2 inches in order to keep the hedge narrow. After the hedge has attained the desired dimensions, the new growth should be trimmed to within an inch of the old growth all over. This is necessary to preserve a green foliage at all times. In general, a hedge that has been properly started should require trimming back of the current growth only three or four times during the season.

## HEDGE TESTS AT THE NORTHERN GREAT PLAINS FIELD STATION

When this project was started in 1915, the hedges at the field station were divided into two classes, namely, trimmed and untrimmed. The rectangular outline of form was chosen for all trimmed hedges. The distance between rows was 10 feet, with spacing within rows ranging from 1 to 3 feet, depending on the species.

Four species, *Populus alba* var. *pyramidalis* Bunge (*P. bolleana* Lauche), *Prunus armeniaca* L., *P. davidiana*, (Carr.) Franch., and *Berberis vulgaris* L., originally included in the test were eliminated in 1917, the first three as unsuitable for hedges and the fourth as illegal in North Dakota. Forty-one species obtained from commercial nursery firms were continued, and in 1922 six more species were planted from seedlings grown at the station from seed obtained from the Division of Foreign Seed and Plant Introduction. These are listed below.

## SPECIES TESTED IN HEDGES

*Acer saccharinum* L. (*A. dasycarpum* Ehrh.).  
*Acer negundo* L.  
*Acer ginnala* Maxim. (*A. tataricum* var. *ginnala* Maxim.).  
*Amelanchier canadensis* (L.) Medic.  
*Berberis thunbergii* DC.  
*Betula populifolia* Marsh.  
*Caragana arborescens* Lam.  
*Caragana spinosa* (L.) DC.  
*Cornus alba* var. *sibirica* Loud. (*C. sibirica* Loud.).  
*Cornus stolonifera* Michx.  
*Cotoneaster acutifolia* Turcz.  
*Crataegus pinnatifida* Bunge.  
*Elaeagnus angustifolia* L.  
*Fraxinus pennsylvanica* var. *lanceolata* (Borkh.) Sarg. (*F. lanceolata* Borkh.).  
*Lonicera tatarica* L.  
*Philadelphus coronarius* L.  
*Physocarpus opulifolius* (L.) Maxim.  
*Physocarpus opulifolius* var. *luteus* (Kirchn.) Zabel (*P. opulifolius* var. *aureus*).  
*Prunus virginiana* L.  
*Prunus tomentosa* Thunb.  
*Prunus triloba* forma *simplex* (Bunge) Rehd.  
*Rhamnus cathartica* L.  
*Ribes aureum* Pursh.  
*Ribes diacanthum* Pall.  
*Rosa rugosa* var. *alba* W. Robins.  
*Rosa rugosa* var. *rosea* Rehd. (*R. rugosa* var. *rubra*).  
*Salix daphnoides* Vill.  
*Salix fragilis* L. (or hybrid with *S. alba*).  
*Salix missouriensis* Bebb.  
*Salix pentandra* L.  
*Sambucus canadensis* var. *aurea* Cowell.  
*Sorbaria sorbifolia* (L.) A. Br.  
*Spiraea arguta* Zabel.<sup>1</sup>  
*Spiraea billiardii* Herincq.<sup>1</sup>  
*Spiraea bumalda* Burvenich var. *alba*.<sup>1</sup>  
*Spiraea bumalda* Burvenich var. *rosea*.<sup>1</sup>  
*Spiraea bumalda* Burvenich var. *Anthony Waterer*.<sup>1</sup>  
*Spiraea vanhouttei* (Briot) Zabel.<sup>1</sup>  
*Syringa chinensis* Willd.  
*Syringa amurensis* (Rupr.) Rupr. (*S. japonica* Deene.).  
*Syringa josikaea* Jacq.  
*Syringa villosa* Vahl.  
*Ulmus americana* L.  
*Ulmus pumila* L.  
*Viburnum opulus* L.  
*Viburnum opulus* var. *roseum* L. (sterile type).

<sup>1</sup> Horticultural variety, apparently of no botanical standing.

DISCUSSION OF SPECIES TESTED IN HEDGES <sup>2</sup>

**ACER SACCHARINUM.**—Silver or soft maple is useful as a screen or large hedge. It takes shearing very well but cannot be kept to small proportions. Average height in 10 years, 6 feet; spread, 5 to 6 feet.

**ACER NEGUNDO.**—Boxelder shears well, especially when young, and makes a dense, large hedge. Average height, 6 to 7 feet; spread, 5 to 6 feet. The ease and cheapness of propagation of this species makes it desirable for use where a good windbreak or screen is wanted.

**ACER GINNALA.**—Tatarian maple makes a good medium-sized hedge. Shears well, especially when young. The foliage is ornamental at all times, but especially in the fall, when it takes on bright russet tints. Average height, 5 to 6 feet; spread, 4 to 5 feet. It does not stand up well in dry seasons.

**AMELANCHIER CANADENSIS.**—Downy serviceberry, locally known as Juneberry, was planted at the station but died the second year after planting. It does not shear well and makes a leggy, sparsely foliated hedge.

**BERBERIS THUNBERGII.**—Japanese barberry makes a low, informal hedge. Average height, 2 feet; spread, 2 to 2½ feet. This species did not survive under dry-land field culture more than 3 years. It seems to be hardy but not drought-resistant.

**BETULA POPULIFOLIA.**—Gray birch makes a narrow, compact hedge. It is not long-lived under dry-land conditions and is of somewhat slow growth. Average height in 10 years, 5 feet; spread, 3 feet.

**CARAGANA ARBORESCENS.**—Siberian pea-tree will thrive under a number of adverse conditions. It is a rapid grower, dense, and very drought-resistant. When sheared, it makes a medium-sized hedge; average height, 4 to 5 feet; spread, 3 to 4 feet. It may also be left untrimmed, when, with an occasional heading back, it makes a medium-sized screen or windbreak (fig. 1).

**CARAGANA SPINOSA.**—This species of *Caragana* is very dwarf, of somewhat sprawly, irregular growth. It does not take shearing well. If left untrimmed, it is useful as a medium-dwarf barrier, as its branches are covered with numerous stiff, unyielding spines. Average height, 2 to 3 feet, width, 2 feet.

**CORNUS ALBA** var. **SIBIRICA.**—Coral dogwood was tried but found unsatisfactory under dry-land conditions.

**CORNUS STOLONIFERA.**—Where some artificial moisture can be applied, red-osier dogwood makes a fairly good, medium-sized hedge. It is rather short-lived at best and cannot be recommended for dry-land conditions.

**COTONEASTER ACUTIFOLIA.**—The Peking cotoneaster is the only *Cotoneaster* species found hardy at the station. It is of dwarf, compact growth and makes one of the best hedges for any location where a dwarf, formal hedge is desired. Average height, 2 to 3 feet; spread, 2 to 2½ feet.

**CRATAEGUS PINNATIFIDA.**—The Chinese hawthorn is of rather recent introduction into this country, and stock is as yet scarce. It makes an excellent hedge and seems to stand shearing very well. It is hardy but is somewhat subject to fire blight. Average height, 3 to 4 feet; spread, 2½ to 3 feet (fig. 2).

<sup>2</sup> The cover page shows a Peking cotoneaster hedge in Bismarck, N. Dak. All other illustrations are of hedges on the grounds of the Northern Great Plains Field Station, Mandan, N. Dak.

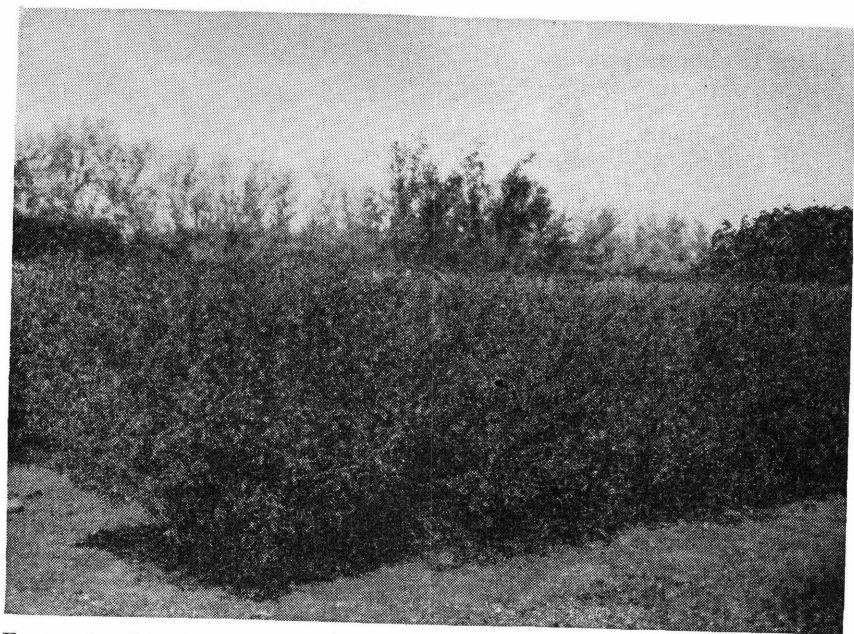


FIGURE 1.—Siberian pea-tree hedge: Age, 19 years; height,  $4\frac{1}{2}$  feet; width, 4 feet.

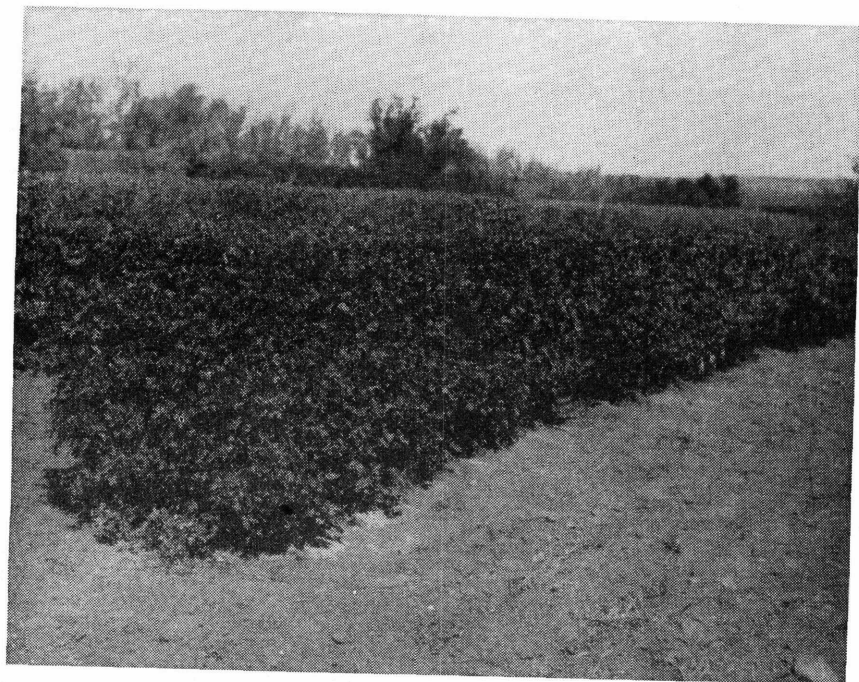


FIGURE 2.—Chinese hawthorn hedge: Age, 13 years; height,  $3\frac{1}{2}$  feet; width, 3 feet.



*ELAEOAGNUS ANGUSTIFOLIA*.—While young, the Russian-olive with its soft, silvery foliage makes a fine-appearing hedge. It may be kept quite low, and its thorns make it useful as a defensive barrier where such a hedge is wanted. With age it takes on considerable spread and is inclined to woodiness with sparse foliage. Average height, 4 to 5 feet; spread, 5 to 6 feet (fig. 3).

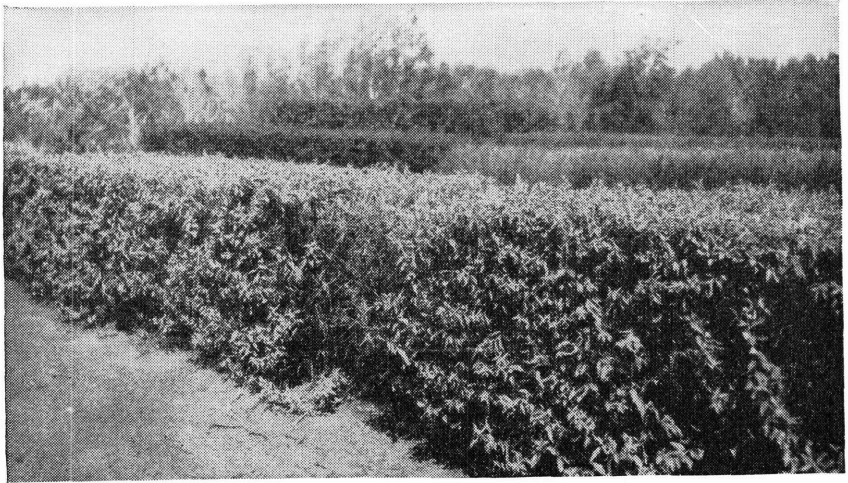


FIGURE 3.—Russian-olive hedge: Age, 19 years; height, 4 feet; width,  $4\frac{1}{2}$  feet.

*FRAXINUS PENNSYLVANICA* var. *LANCEOLATA*.—The green ash is of slow growth in its early stage but makes a very fine, upright, dense, and fairly narrow hedge, suitable where a tall screen or shelter is wanted. It is hardy and drought-resistant but somewhat susceptible to late frost injury. Average height, 6 to 7 feet; spread, 4 to 5 feet (fig. 4).

*LONICERA TATARICA*.—Tatarian honeysuckle makes a good hedge. It is easily propagated, a rapid grower, and one of the most economical hedges to use. It cannot be kept dwarf, however, and is inclined to bareness at the bottom. Average height, 4 feet; spread, 3 feet.

*PHILADELPHUS CORONARIUS*.—Because it kills back severely every winter, this variety of mockorange is unsatisfactory as a hedge under dry-land conditions. Where it succeeds, it can make a nice hedge, as it is very bushy and stands shearing very well. Average height, 3 feet; spread,  $2\frac{1}{2}$  feet.

*PHYSOCARPUS OPULIFOLIUS*.—The common ninebark does fairly well both as sheared and unsheared hedges while young. It is not drought-resistant, however, and kills out after 4 or 5 years if no artificial watering is supplied.

*PHYSOCARPUS OPULIFOLIUS* var. *LUTENS*.—The golden ninebark is similar in behavior to the common, and cannot be recommended as a hedge under dry-land conditions.

*PRUNUS VIRGINIANA*.—The western chokecherry is easily started and propagated, but it does not make a good hedge. It suckers badly and kills out in patches, so it is difficult to keep symmetrical and within bounds. Average height, 4 feet; width, 4 feet.



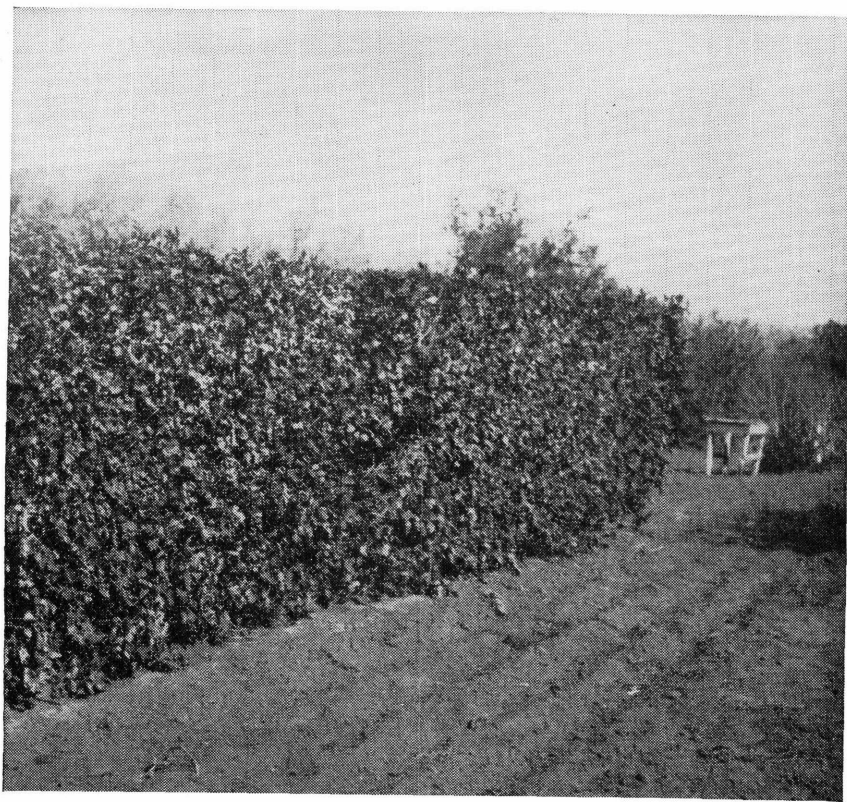


FIGURE 4.—Green ash hedge: Age, 19 years; height, 6 feet; width,  $4\frac{1}{2}$  feet.

*PRUNUS TOMENTOSA*.—The Nanking cherry makes a dense, compact hedge and may be kept to dwarf and small proportions. It winter-kills somewhat under dry-land conditions and is susceptible to plum borers. Average height, 2 to 3 feet; width, 2 feet (fig. 5).

*PRUNUS TRILOBA* *FORMA SIMPLEX*.—The flowering plum is similar to the Nanking cherry but makes a denser, bushier hedge and is much hardier (fig. 6).

*RHAMNUS CATHARTICA*.—The common buckthorn is one of the three best shrub species for the northern Great Plains. It makes a dense, bushy hedge at an average height of 4 feet. Its thorny branches and late persistent foliage make it a desirable hedge where protection and backgrounds for small gardens are wanted. It is drought-resistant under dry-land conditions and of first degree hardiness (fig. 7). The buckthorns serve as alternate hosts for crown (leaf) rust of oats, which does great damage to the oat crop. The common buckthorn is particularly susceptible to infection; therefore its use is, in general, undesirable. The glossy buckthorn (*R. frangula* L.) and the dahurian buckthorn (*R. davurica* Pall.) are immune or highly resistant to infection by crown rust in the United States. Both species are hardy in the northern Great Plains and may be substituted for the more susceptible species.

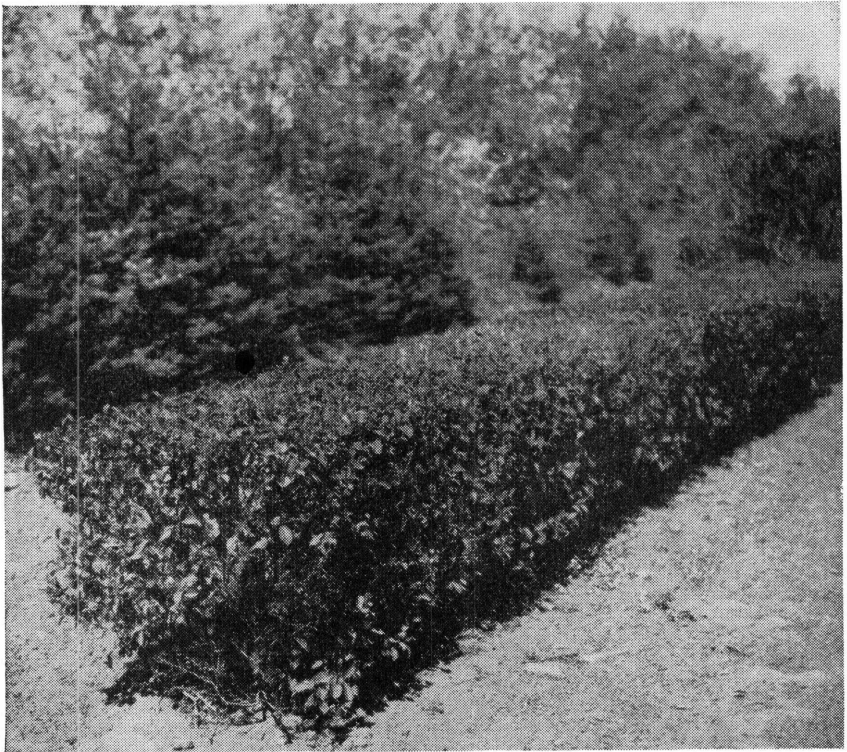


FIGURE 5.—Nanking cherry hedge: Age, 11 years; height, 2 feet; width, 2 feet.

**RIBES AUREUM.**—The golden currant makes a quick-growing hedge of small proportions suitable for small lots. Average height, 2 to 3 feet. It is short-lived, going to pieces in 8 to 10 years, and is inclined to legginess even in its young stages.

**RIBES DIACANTHUM.**—*Ribes diacanthum* is a comparatively recent introduction into this country, and at the Northern Great Plains Field Station it seems to be the best substitute for privet where a similar hedge is wanted. It is of dense growth and may be kept sheared down to 2 to 2½ feet. It is one of the first species to leaf out in the spring, and its foliage is ornamental at all times. Legginess and susceptibility to borers seem its only faults, but these could probably be overcome by more or less frequent renewals by cutting back to the ground (fig. 8).

**ROSA RUGOSA** var. **ALBA** AND var. **RUBRA.**—The white and the red *R. rugosa* roses made poor, irregular growth and only survived 2 years. They do not seem suitable for dry-land conditions on the northern Great Plains.

**SALIX** spp.—Five willows were tested in hedges. These were the Sharpleaf or Caspian willow; the native diamond willow; the laurel or laurel-leaf willow; and one received as white willow and one as Russian Golden willow, both of which have been identified as forms of *S. fragilis* L. (or hybrid with *S. alba*). All survived about 15 years; but, owing to severe winter-killing, none were found desirable after 5 to



6 years. In locations favored by a good supply of moisture they might be suitable where a large hedge or screen is wanted. Average height, 5 to 6 feet; width, 5 feet.

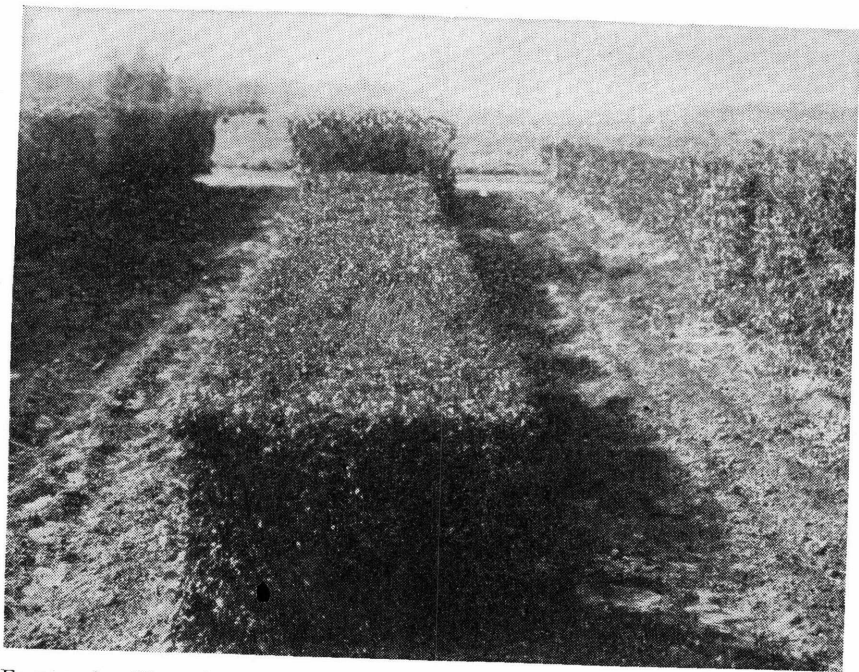


FIGURE 6.—Flowering plum hedge: Age, 11 years; height,  $2\frac{1}{2}$  feet; width,  $2\frac{1}{2}$  feet.

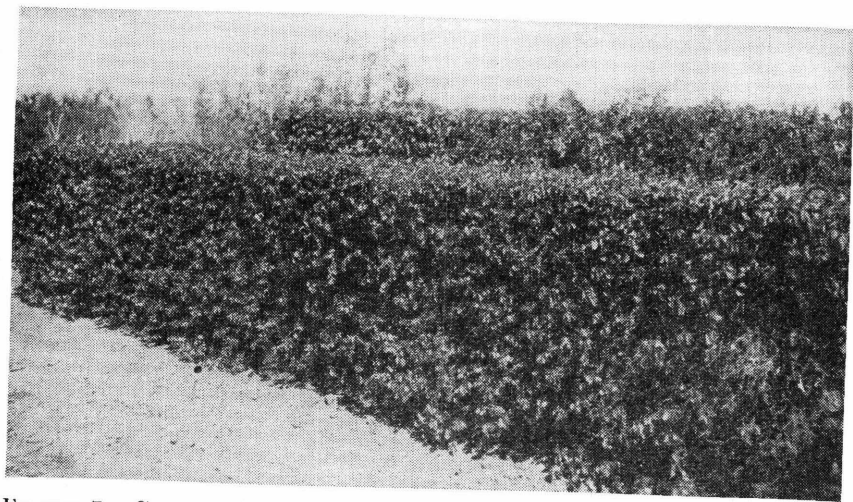


FIGURE 7.—Common buckthorn hedge: Age, 19 years; height,  $4\frac{1}{2}$  feet; width, 4 feet.



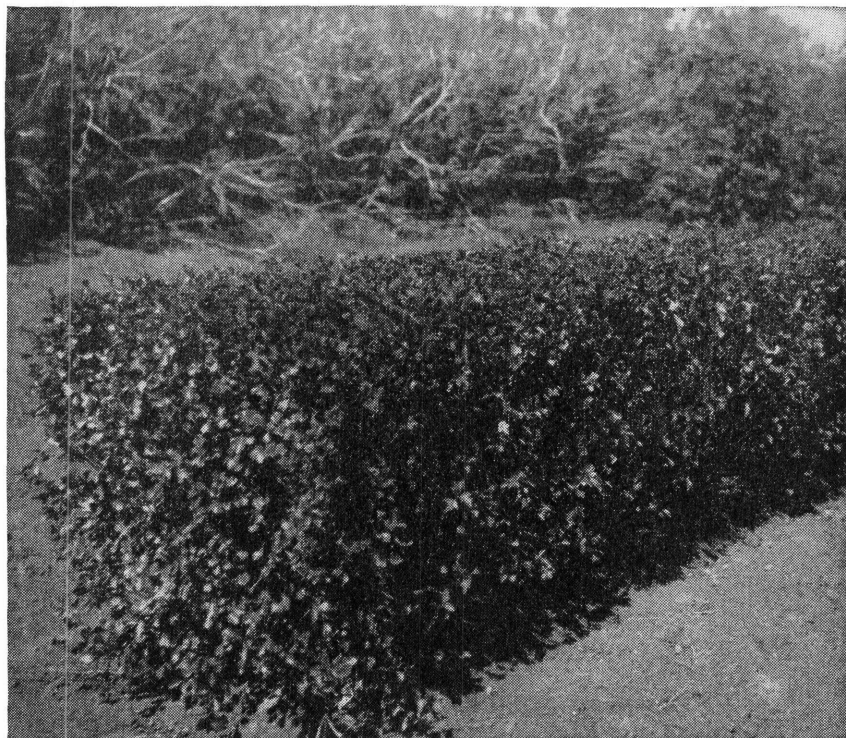


FIGURE 8.—*Ribes diacanthum* hedge: Age, 11 years; height,  $2\frac{1}{2}$  feet; width,  $2\frac{1}{2}$  feet.

*SAMBUCUS CANADENSIS* var. *AUREA*.—American golden elder succeeded poorly as a hedge. There was much winter-killing, and the current season's growth sheared badly.

*SORBARIA SORBIFOLIA*.—Ural false spirea was unsuccessful as a hedge. The older growth sheared poorly, and the suckering habit of the plants made it difficult to control.

*SPIRAEA* spp.—Six varieties or species of spirea—Garland, Billiard, *S. bumalda* var. *alba*, *S. bumalda* var. *rosea*, Anthony Waterer, and *S. vanhouttei* were grown as untrimmed hedges. Garland spirea (*S. arguta*) on the whole makes a very satisfactory hedge of medium proportions. Average height, 3 to  $3\frac{1}{2}$  feet. There has been considerable tipkilling each year it has been under test, and there was considerable deadwood one extra-dry season. It renews itself freely, however, and is attractive the entire season. It is the earliest species to blossom in this region, and the floral display usually lasts 2 weeks. Billiard spirea and the varieties of *S. bumalda*, of which Anthony Waterer is the common one, were not desirable under dry-land conditions, frequently dying out in dry periods. Where water can be supplied, they seem hardy and make low hedges of pleasing appearance. Average height,  $1\frac{1}{2}$  to 2 feet. Vanhoutte spirea makes an excellent hedge of medium proportions. It is hardy but not drought-resistant, and in years following dry falls it kills back severely. It renews



itself very well after cutting back to the ground, however, and presents a pleasing appearance at all times of the season. Average height, 3 to 4 feet (fig. 9).

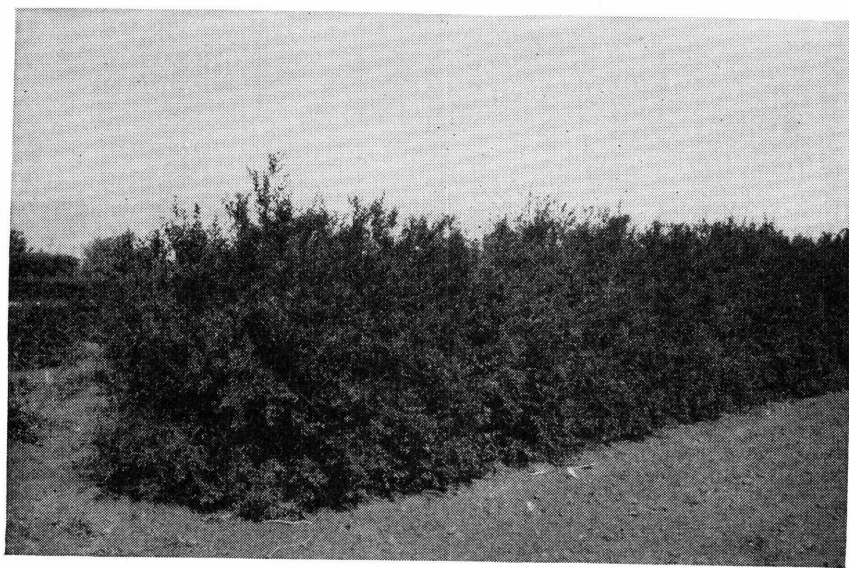


FIGURE 9.—Vanhoutte spirea untrimmed hedge.

*SYRINGA* spp.—The lilacs have proved to be excellent material for hedge purposes on the northern Great Plains, as they have been very good as to hardiness and drought resistance. They are somewhat expensive to start and make hedges that are rather bulky and of large dimensions. Four species, *S. chinensis*, *S. amurensis*, *S. josikaea*, and *S. villosa*, were tested. The Chinese lilac (*S. chinensis*) was received as *S. persica* but was later identified as *S. chinensis*. It grows to rather large size and takes up considerable space. It is very attractive in appearance when from 5 to 10 years old and also keeps its density to the ground after 20 years. No winter-killing or drought damage was observed while it was growing at the station. Average height in 10 years, 4 feet; 20 years, 5 feet; width, 5 to 6 feet (fig. 10).

The Japanese lilac (*S. amurensis*) is of the same hardiness and drought resistance as the Chinese. It is not quite so dense in structure and is somewhat more unwieldy in proportions. Average height, 5½ feet; width, 6 feet.

The Hungarian lilac (*S. josikaea*) when young makes a hedge of pleasing appearance and moderate proportions. It is not drought-resistant and kills back severely following a dry fall. Its upright, narrow growth and glossy foliage make it desirable in situations where some water can be supplied. Average height, 3 feet; width, 2½ to 3 feet.

The Himalayan or Late lilac (*S. villosa*) is similar to the Hungarian but is bushier and of more robust growth. It is not drought-resistant and kills back after a dry fall. Average height, 3½ feet; width, 3 feet.

*ULMUS AMERICANA*.—The American elm may be used as a tall

hedge or screen, but it does not make a very desirable one. It seems perfectly hardy and drought-resistant but is coarse and open in growth. Height, 6 feet or more; width, 5 to 6 feet.

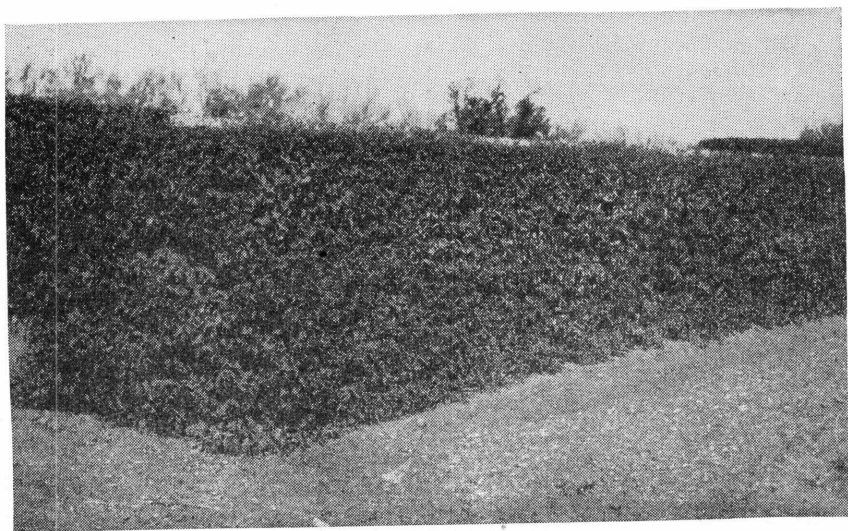


FIGURE 10.—Chinese lilac hedge: Age, 19 years; height, 5 feet; width,  $5\frac{1}{2}$  feet.

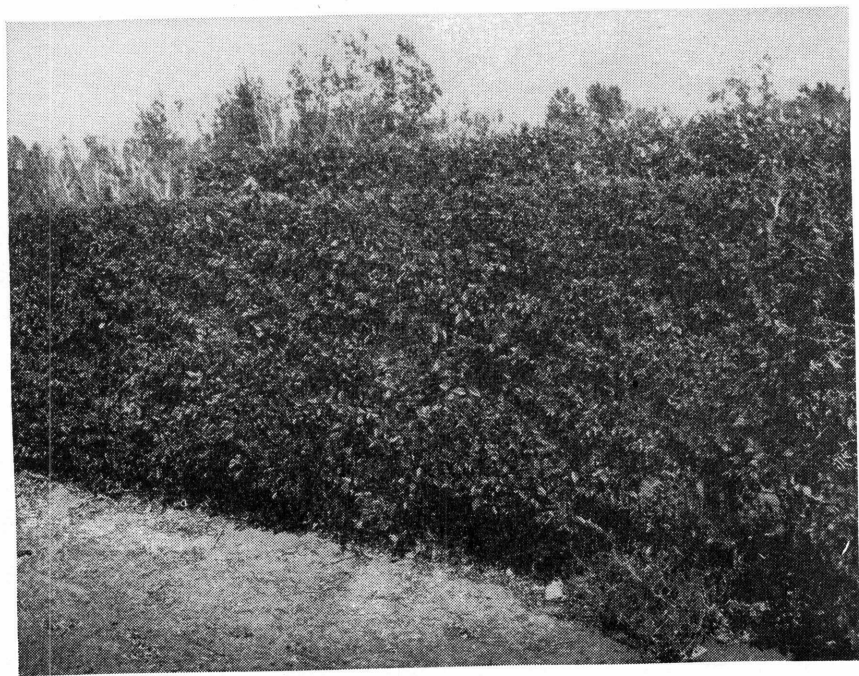


FIGURE 11.—Siberian (Chinese) elm hedge: Age, 11 years; height, 5 feet; width,  $4\frac{1}{2}$  feet.

*ULMUS PUMILA*.—The Siberian elm, commonly known in the northern plains as Chinese elm, has not been tested as a hedge so long as most of the other species, but it appears to be one of the most desirable and promising for general use in this region. It is easily propagated, makes rapid and dense growth, takes shearing well, and may be kept to fairly small dimensions. Average height, 4 to 5 feet; width, 3 to 4 feet (fig. 11).

*VIBURNUM OPULUS*.—The European cranberry bush failed as a hedge. It is of open, leggy growth and shears badly. It appears to be fairly hardy, but is not drought-resistant. Average height, 3 to 4 feet; width, 3 feet.

*VIBURNUM OPULUS* var. *ROSEUM* (STERILE TYPE).—The snowball was similar to *V. opulus* in growth and characteristics. It failed in the station tests to make a good hedge. Average height, 3 to 4 feet; width, 3 feet.

